LINCOLN COUNTY – OWL'S DEN LANDFILL
SITE ASSESSMENT PLAN
LINCOLNTON, NORTH CAROLINA

S&ME Project No. 1356-08-002

Prepared for:
North Carolina Department of Environment and Natural Resources
Division of Waste Management – Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Prepared by:
S&ME, Inc.
9751 Southern Pine Blvd
Charlotte, North Carolina 28273

February 27, 2008

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February 27, 2008

NC Department of Environment and Natural Resources
Division of Waste Management – Solid Waste Section
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Ms. Jaclynne Drummond
Compliance Hydrogeologist

Reference: **Site Assessment Plan**
Owl's Den Landfill
Lincolnton, North Carolina
S&ME Project No. 1356-08-002

Dear Ms. Drummond:

The enclosed is a Site Assessment Plan for the Lincoln County Owl's Den Landfill. This plan is in response to your letter dated November 8, 2007 to Lincoln County requesting a groundwater and methane assessment due to contaminants exceeding North Carolina 2L standards and methane levels exceeding the lower explosive limit (LEL) at the property boundary. As per your request, S&ME has prepared this assessment plan to evaluate the extent of groundwater and methane impact on-site.

Respectfully submitted,

S&ME, Inc.

Courtney R. Withers
Staff Professional

Julie R. Petersen, P.G.
Senior Hydrogeologist
NC Registration No. 1995

NORTH CAROLINA LICENSED SEAL 1995 GEOLOGIST JULIE R. PETERSEN

Senior Reviewed by Neal McElveen, P.E., Environmental Services Manager

cc: Nancy Rickard, Lincoln County Solid Waste Director

CRW/JRP/nc

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1. INTRODUCTION

S&ME began semi-annual surface water sampling at the Lincoln County Owl's Den Landfill in 1997. During subsequent sampling events, two volatile organic compounds (VOCs), cis-1,2-dichloroethene and trichloroethene, were detected at surface water sampling location SW-2. Due to the detection of these volatile organic compounds, the NCDENR requested further site assessment at the Lincoln County Owl's Den Landfill.

In 2000, S&ME performed an initial site assessment, which included installation and semi-annual sampling of four shallow groundwater monitoring wells, MW-1, MW-2, MW-3, and MW-4. A private water supply well survey was also performed, which identified fifteen private water supply wells located within ¼-mile radius of the estimated edge of waste. After initial sampling, four of the private supply wells located closest to the edge of waste were selected for continued annual sampling.

Subsequent semi-annual sampling of the on-site monitoring wells indicated that there were VOC concentrations in monitoring wells MW-2, MW-3, and MW-4, which exceeded NCAC 2L groundwater quality standards. Due to the NCAC 2L exceedances in monitoring wells MW-2, MW-3, and MW-4, NCDENR requested further site assessment.

S&ME performed additional site assessment activities in 2001, which included the installation of 5 additional groundwater monitoring wells, MW-5, MW-6, MW-6A, MW-7, and MW-7A, as well as, four methane monitoring wells, MMW-1, MMW-2, MMW-3, and MMW-4, which were incorporated into the semi-annual sampling at the site. Nested pairs MW-6/6A and MW-7/7A were installed as close as practical to the surface water features on-site to evaluate hydraulic gradients. During subsequent sampling events, VOC concentrations exceeding NCAC 2L groundwater quality standards were detected in the following monitoring wells; MW-2, MW-3, MW-4, MW-6, MW-6A, and MW-7. Also, methane concentrations measured in MMW-1, MMW-2, MMW-3, and MMW-4 exceeded the Lower Explosive Limit (LEL) one or more times.

In 2004, NCDENR requested additional assessment at the Owl's Den Landfill due to VOCs exceeding groundwater quality standards and methane levels exceeding the LEL near the property boundary. To address this issue, NCDENR suggested remediation and/or acquisition of additional buffer. Lincoln County has since purchased two adjacent parcels to the southeast of the landfill in the vicinity of MW-3 and MMW-3, as well as, property to the north of the Owl's Den Landfill site. The parcels to the southeast of the site were purchased to provide additional buffer between the edge of waste and private properties in the vicinity of MW-3 and MMW-3. The property to the north of the landfill was purchased to provide Lincoln County ownership of property at the apparent discharge point of groundwater from the site.

With the additional property purchase, NCDENR has requested that further assessment of upgradient groundwater and methane be performed to evaluate the extent of migration

on-site and a demonstration that Lincoln County owns property to the groundwater discharge downgradient of the landfill, to evaluate if corrective actions are required.

2. DOWN GRADIENT SITE ASSESSMENT

As mentioned previously, Lincoln County purchased property to the north of the landfill in the vicinity of surface water sampling location SW-2 to acquire ownership of property up to the groundwater discharge for the site. As shown on the included Site Map, Figure 1, groundwater in the vicinity of the landfill generally flows to the north-northwest toward the drainage features bordering the site on the west, north and east of the property.

Vertical hydraulic gradients have been calculated semi-annually in the nested monitoring wells on-site, MW-6/6A and MW-7/7A. Vertical hydraulic gradients are included in Table 1. Historically, monitoring well nest MW7/7A has typically shown a positive vertical hydraulic gradient which indicates an upward flow component at the well nest signifying that the well nest is located near a hydrologic discharge feature. However, monitoring well nest MW-6/6A, has historically shown a downward flow component.

The downward flow component at MW-6/6A can be due to several factors (1) the well nest may not be close enough to the discharge to exhibit an upward flow component, (2) the separation distance between the shallow well screen and the deep well screen may not be great enough to show an upward flow component, and (3) the well nest may not be located near a discharge feature. Due to limited site accessibility in the vicinity of MW-6/6A, installation of another well nest closer to the stream is not practical. However, based on the topography of the site and the areas surrounding the landfill, the groundwater flow direction on-site, and the overall hydrology of the area, it is expected that the groundwater in the vicinity of the landfill is a subdued reflection of the topography, in which the stream to the west of the landfill is a groundwater discharge, which is typical for unconfined aquifers in the Piedmont Physiographic Providence.

Given the above information, Lincoln County now owns property up to the groundwater discharge for the site and S&ME anticipates that no further assessment will be necessary down gradient of the landfill.

3. UP GRADIENT SITE ASSESSMENT

Additional up gradient site assessment is required at the site due to VOC exceedances in groundwater monitoring wells MW-1 and MW-3, and methane concentrations above the LEL in methane monitoring wells MMW-1 and MMW-3 which are/were located near the property boundary. Historical groundwater concentrations on-site are provided in Table 2.

3.1 MW-3 and MMW-3

Groundwater monitoring well MW-3 has historically contained contaminants exceeding water quality standards, and methane monitoring well MMW-3 has historically produced methane readings above the LEL. Prior to the property purchase adjacent to these wells, MW-3 and MMW-3 were located in between the estimated edge of waste and the

property boundary, which had a buffer of approximately 80 feet. Due to the limited buffer area, the wells were installed approximately 50 feet from the property line and 30 feet from the estimated edge of waste. It is expected that the exceedances in these wells are most likely due to their close proximity to the estimated edge of waste.

Lincoln County has since purchased property adjacent to MW-3 and MMW-3 to add additional buffer for the landfill in between the estimated edge of waste and residential properties to the southwest of the site. S&ME proposes to install two additional groundwater monitoring wells on the purchased property 50 feet from the property boundary, located in between the estimated edge of waste and the residential properties to the southwest (PMW-8 and PMW-9). Along with the groundwater monitoring wells, S&ME also proposes to install two additional methane monitoring wells (PMMW-5 and PMMW-6) in the vicinity of the newly proposed groundwater monitoring wells.

Proposed groundwater monitoring wells PMW-8 and PMW-9 and proposed methane monitoring wells PMMW-5 and PMMW-6 will be utilized to evaluate if groundwater contamination or methane is moving off site in the up-gradient direction toward the residences to the southwest of the landfill along Owl's Den Road and to determine if corrective measures need to be taken. Proposed well locations are indicated on the Site Map, Figure 1.

3.2 MW-1 and MMW-1

Historically, groundwater monitoring well MW-1 has not had detections of VOCs during the semi-annual sampling events, except for an isolated detection of naphthalene in April 2004. However, during the April 2007 sampling event, twelve VOCs were detected in MW-1, some of which were above their respective NCAC 2L standards. Of the twelve constituents detected all but one had not been previously detected on-site. The pursuant sampling event in October 2007 indicted no VOC detections in MW-1.

Due to the fact that (1) historically MW-1 has had no VOCs detections prior to the April 2007 sampling event, (2) the majority of the VOCs detected in MW-1 had not been detected previously on-site, and (3) subsequent sampling events have had no VOC detections, S&ME contacted the laboratory to evaluate if the detected VOCs were laboratory contaminants. Environmental Conservation Laboratories (ENCO) performed the groundwater analysis on the April 2007 sample, and after further analysis concluded that the April 20007 concentrations reported for MW-1 were due to laboratory false positives and were not indicative of the actual groundwater sample. ENCO has since prepared a letter stating the above information and it is included in Appendix I.

Since MW-1 has historically not had VOC detections and the April 2007 detections were laboratory false positives, S&ME proposes that groundwater monitoring well MW-1 remain the facility's background monitoring well, and that no further groundwater assessment is needed in the vicinity of MW-1.

Due to methane concentrations above LEL in methane monitoring well MMW-1, S&ME proposes to install an additional methane monitoring well (PMMW-7) adjacent to

groundwater monitoring well MW-1 to evaluate the extent of methane migration in between MMW-1 and the property line. Proposed well locations are indicated on the Site Map, Figure 1.

3.3 Additional Well Locations

In addition to the groundwater and methane monitoring wells proposed above, S&ME also proposes to install an additional groundwater monitoring well (PMW-10) approximately 50 feet from the property boundary in between the estimated edge of waste and the residences to southeast of the landfill along Owl's Den Road. PMW-10 will be utilized to evaluate if groundwater contamination is moving off site in the up-gradient direction toward the residences to the southeast of the landfill and to determine if corrective measures need to taken.

Two additional methane monitoring wells are proposed up gradient of the landfill. PMMW-8 will be located adjacent to PMW-10, and PMMW-9 will be located in between the estimated edge of waste and the re-located convenience site. The purpose of the methane monitoring wells will be to evaluate if methane is migrating up gradient of the site toward the convenience site and residences to the southeast of the landfill. Proposed well locations are indicated on the Site Map, Figure 1.

4. DESCRIPTION OF FIELD ACTIVITIES

S&ME will perform the following field activities as part of the proposed Lincoln County Owl's Den Landfill Site Assessment Plan:

4.1 Well Installation

To further evaluate on-site groundwater contaminant and methane migration, S&ME proposes to install three additional shallow groundwater monitoring wells (PMW-8, PMW-9, and PMW-10), as well as, five additional methane monitoring wells (PMMW-5 through PMMW-9) at the Lincoln County Owl's Den Landfill. The locations of the proposed wells are indicated on the attached Site Map, Figure 1. Groundwater and methane monitoring wells will be installed in accordance with the 15A NCAC 2C standards.

4.1.1 Groundwater Monitoring Well Installation

Three groundwater monitoring wells (PMW-8, PMW-9, and PMW-10) will be installed utilizing an ATV drill rig with 4.25-inch hollow-stem augers. The groundwater wells will be constructed of 2-inch diameter Schedule 40 PVC casing with 15-feet of 0.010-inch machine slotted PVC screen. The sand pack will consist of #2 silica sand extending from the base of the screen to approximately 2-feet above the screen. A 2-foot bentonite seal will be placed on top of the sand pack then completed to ground surface with a neat cement grout. A typical shallow groundwater monitoring well diagram is included in this report as Figure 2. Well screen elevations will be determined in the field by the on-site Geologist so that the well screens bracket the groundwater table.

To complete the groundwater wells, an above grade 4-inch by 4-inch steel protective cover with a lockable cap will be sealed in the center of a 2-foot by 2-foot concrete pad. The protective cover will be identified with a permanently affixed well I.D. tag in accordance with North Carolina well regulations.

After construction is complete, the monitoring wells will be surveyed to obtain ground surface and top of casing elevations. Boring logs and well construction records will be submitted to the NCDENR-Solid Waste Section (SWS) after well completion.

4.1.2 Methane Monitoring Well Installation

Five methane monitoring wells will be installed utilizing an ATV drill rig with 2.25-inch hollow-stem augers. The methane wells will be installed to depths above the groundwater table and constructed of 1-inch Schedule 40 PVC screen and casing. Methane wells will be screened with 0.010-inch slotted screen of variable length. The annulus of the boring surrounding the screen will be backfilled with #2 silica sand to within 3 feet of the land surface. A 1-foot bentonite seal will be placed on top of the sand pack then completed to ground surface with a neat cement grout. The top of the casing extending from the ground surface will be finished with a quick connect fitting cap that will allow for methane measurements from the well without removing the cap. A typical methane monitoring well diagram is included as Figure 3.

To complete the methane wells, an above grade 4-inch by 4-inch steel protective cover with a lockable cap will be sealed in the center of a 2-foot by 2-foot concrete pad. The protective cover will be identified with a permanently affixed well I.D. tag in accordance with North Carolina well regulations.

4.2 Development and Slug Testing

After installation, groundwater monitoring wells will be developed to remove clay, silt, and sand particles that may have been introduced into the formation or filter pack during installation. Development will be conducted as soon as practical after installation, but no sooner than 24 hours after completion.

In order to evaluate the hydrogeological characteristics of the subsurface materials, S&ME will perform in-situ permeability tests (slug tests) in the groundwater monitoring wells. Slug tests will be performed in the field utilizing the rising-head method, in which water is pumped from the well and recharge is recorded with time. Data collected from slug testing will be analyzed to calculate horizontal permeability. Slug tests will be conducted as soon as practical after the wells are developed, but no sooner than 24 hours after development to allow water levels to stabilize.

4.3 Sampling

The initial sampling event for the new groundwater monitoring wells will be scheduled to occur after development and slug testing. Subsequent groundwater sampling will be on a semi-annual basis occurring in the months of April and October during semi-annual sampling of the existing monitoring wells and surface water locations.

Groundwater monitoring wells will be purged a minimum of three well volumes 24-hours prior to sample collection. Samples will be collected using a disposable Teflon bailer and placed in laboratory provided sample bottles. Sample bottles will be packaged on ice and sent to a certified laboratory for analysis. Groundwater samples will be analyzed for total RCRA metals and EPA Method 8260 volatile organic compounds. All groundwater quality monitoring data will be compared to the North Carolina Standards, 15A NCAC 2L standards and SW GWP standards.

During the initial sampling event for the new groundwater monitoring wells, methane readings from the new methane monitoring wells will be recorded utilizing a GEM 500 Gas Meter. The methane monitoring wells will be subsequently monitored on a semi-annual basis along with existing methane monitoring wells, with concentrations reported in the semi-annual monitoring reports for the site.

5. LABORATORY TESTING

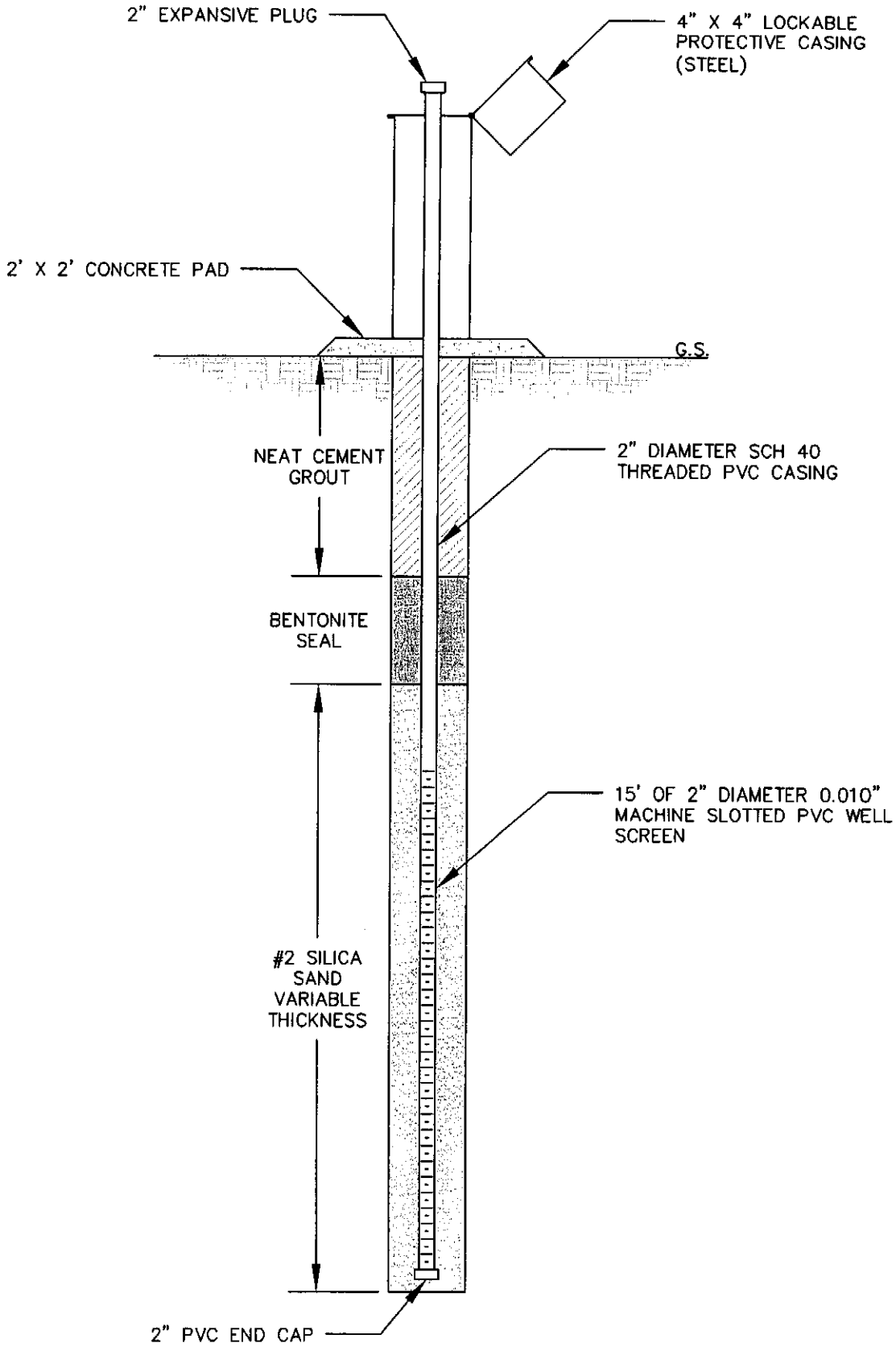
S&ME will perform laboratory grain size distributions with hydrometer and specific gravity tests on selected split-spoon soil samples recovered from the saturated portion of the screened interval from each newly installed groundwater monitoring well. S&ME will utilize the results of the laboratory grain size distribution with hydrometer and specific gravity tests to estimate porosity of the formation adjacent to the screened intervals of the groundwater monitoring wells.

6. REPORTING

Following field activities, S&ME will submit a report to the NCDENR-SWS which will include the following information:

- Methane and groundwater monitoring well construction activities;
- Boring logs, well logs, and well construction records;
- Soil laboratory data;
- Well sampling activities and well sampling records;
- Groundwater analytical data;
- Recorded methane concentrations;
- Calculations of hydraulic conductivity, porosity, and groundwater flow velocity;
- Groundwater surface map; and
- Recommendations for further assessment on site.

825
880
930
OWLS DEN ROAD



SCALE:	NTS
DATE:	2/26/08
DRAWN BY:	ELH
PROJECT NO:	1356-08-002

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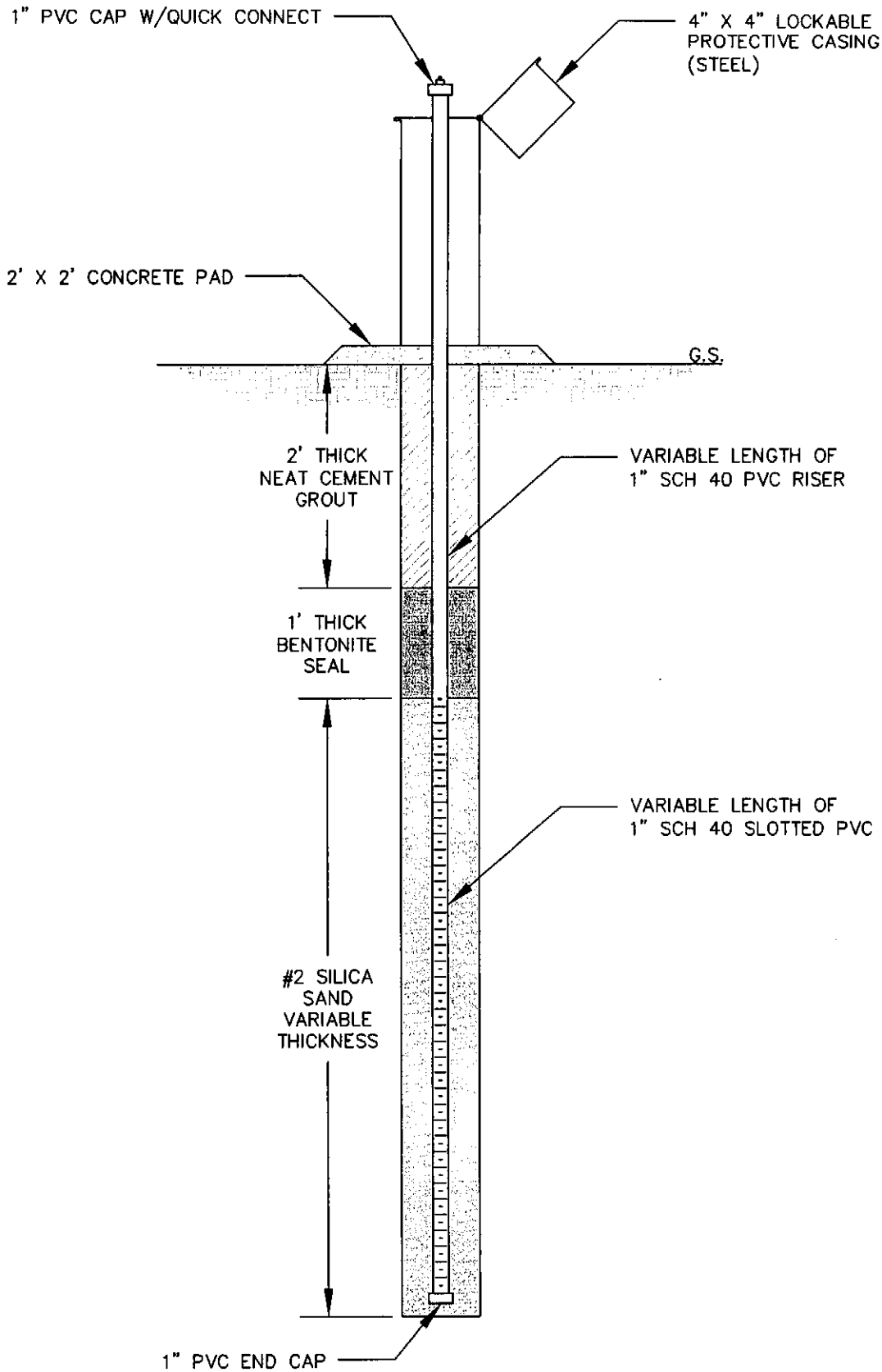
TYPICAL TYPE II GROUNDWATER MONITORING WELL
LINCOLN COUNTY – OWL'S DEN LANDFILL
LINCOLTON, NORTH CAROLINA

FIGURE NO. 2



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TYPICAL METHANE MONITORING WELL
LINCOLN COUNTY – OWL'S DEN LANDFILL
LINCOLTON, NORTH CAROLINA

FIGURE NO. 3

Table 1
Historical Vertical Gradients (Nested Wells)
Lincoln County Owl's Den Landfill
S&ME Project No. 1356-08-002

Well ID	MW-6		MW-6A		Difference*	MW-7		MW-7A		Difference*
GS Elev. (ft)	805.44		805.17		MW-6/6A	815.47		814.68		MW-7/7A
TOC Elev. (ft)	808.55		808.61			818.44		817.48		
Date	DTW-TOC (ft)	WL-Elev. (ft)	DTW-TOC (ft)	WL-Elev. (ft)	WL-Elev. (ft)	DTW-TOC (ft)	WL-Elev. (ft)	DTW-TOC (ft)	WL-Elev. (ft)	WL-Elev. (ft)
8/7/2001	17.20	791.35	18.86	789.75	-1.60	22.92	795.52	21.03	796.45	0.93
8/16/2001	17.25	791.30	18.81	789.80	-1.50	22.97	795.47	20.82	796.66	1.19
9/12/2001	17.23	791.32	18.60	790.01	-1.31	22.93	795.51	21.96	795.52	0.01
10/18/2001	17.23	791.32	18.61	790.00	-1.32	23.00	795.44	21.64	795.84	0.40
4/4/2002	16.12	792.43	18.19	790.42	-2.01	22.45	795.99	21.31	796.17	0.18
10/25/2002	17.09	791.46	18.66	789.95	-1.51	23.20	795.24	22.55	794.93	-0.31
4/24/2003	14.36	794.19	17.34	791.27	-2.92	21.36	797.08	20.09	797.39	0.31
10/10/2003	16.15	792.40	17.69	790.92	-1.48	22.40	796.04	21.10	796.38	0.34
4/23/2004	17.45	791.10	17.80	790.81	-0.29	22.20	796.24	20.94	796.54	0.30
10/8/2004	16.64	791.91	18.18	790.43	-1.48	22.47	795.97	21.24	796.24	0.27
4/22/2005	15.51	789.93	17.90	787.27	-2.66	23.05	792.42	20.71	793.97	1.55
10/21/2005	16.73	791.82	18.40	790.21	-1.61	22.55	795.89	22.00	795.48	-0.41
4/27/2006	16.16	792.39	18.00	790.61	-1.78	22.22	796.22	21.51	795.97	-0.25
10/6/2006	17.09	788.35	18.62	786.55	-1.80	22.81	792.66	21.49	793.19	0.53
4/12/2007	16.23	792.32	18.24	790.37	-1.95	22.42	796.02	21.02	796.46	0.44
10/19/2007	17.53	791.02	18.88	789.73	-1.29	23.33	795.11	22.03	795.45	0.34

* Negative = downward flow component, Positive = upward flow component

Notes:

TOC - top of casing

DTW - depth to water

GS - ground surface

WL - water level

Elev - elevation

(ft) - feet

Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-1 (Background)													Revised NCAC 2L	MW-1	
			10/18/00	04/19/01	10/18/01	04/04/02	10/25/02	04/24/03	10/10/03	04/23/04	10/08/04	04/22/05	10/21/05	04/28/06	10/06/06		4/12/2007*	10/19/07
1	Bromoform	4.43														4.43	2.2	
2	Bromomethane	DL														DL	1.5	
3	2-Butanone	4200														4200	4.2 J	
4	2-Chloroethyl Vinyl Ether	DL														DL	3.4	
5	1,2-Dibromo-3-chloropropane	0.025														0.025	1	
6	1,1-Dichloropropene	DL														DL	5	
7	2-Hexanone	280														280	0.41 J	
8	Naphthalene	21								2						21	2.3	
9	Tetrachloroethene	0.7														0.7	0.83 J	
10	1,2,3-Trichlorobenzene	DL														DL	1.7	
11	1,2,4-Trichlorobenzene	70														DL	1.6	
12	1,2,3-Trichloropropane	0.005														0.005	1.9	
	Metals																	
1	Arsenic	50														50	2.7 J	
2	Barium	2000	120	450	140	190	140	200	100	120	110		84	150	140	2000	122	205
3	Chromium	50														50		5.6 J
4	Selenium	50														50	2.8 J	

Notes:

1 All units are in micrograms per liter (µg/L) or (parts per billion)

2 Shaded results are above NCAC 2L standards.

3 Compounds not shown were not detected

4 Target analytes not shown were reported below detection limits

5 J - Value reported is between the Method Detection Limit (MDL) and the Method Reporting Limit (MRL)

6 * - As a laboratory oversight, false positives were initially reported for MW-1 in April 2007; Revised results were reported in February 2008

Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-2												Revised NCAC 2L	MW-2	
			10/18/00	04/19/01	10/18/01	04/04/02	10/25/02	04/24/03	10/10/03	04/23/04	10/08/04	04/22/05	10/21/05	04/28/06	10/06/06		04/12/07	10/19/07
1	Benzene	1	2.7	2.1	1.2			3.8	2.4	1.3	4.0		1.4	1.6		1		0.46 J
2	Chlorobenzene	50	1.9	2.6			2.4	2.7	3.3	3.6	4.2		4.1	3.9		50	5.1	3.6
3	Chloroethane	2800				2.3		2.3								2800		0.67 J
4	2-Chlorotoluene	140	4.6	5.4	4.2	4.7	3.5	4	4.7	4.6	5.6					DL	4.3	3
5	4-Chlorotoluene	DL			0.84 J											DL		
6	1,2-Dichlorobenzene	620								1.1			1			24	0.68 J	0.76 J
7	1,3-Dichlorobenzene	620														170	0.36 J	0.44 J
8	1,4-Dichlorobenzene	75	4.3	5.3			4.1	5.7	5.4	5.1		5	5.6	5.6	5.5	1.4	6.1	4.9
9	1,1-Dichloroethane	700	8.4	9	7	6.4	6	8	5.1	3.6	4	6		3.3		70	3.7	2.9
10	cis-1,2-Dichloroethene	70	27	36	25	23	22	20	21	16	14	20	14	12	11	70	7	6.7
11	1,2-Dichloropropane	0.56	4.6	5.1	4.9	5	4.7	5.3	4.2	3.7	3.6	5	4.4	2.8		0.51	3.1	2.4
12	Methyl tert-butyl ether (MTBE)	200	2.4		1.8		2.1	1.7	1.9	2	1					DL	1.3	
13	n-Propylbenzene	70		<1							3.6					DL		
14	1,2,4-Trichlorobenzene	70		1.2												70		
15	Vinyl Chloride	0.015	1.5	2		3.9		1.1								0.015	0.75 J	0.81 J
	Metals																	
1	Barium	2000	590	6500	520	620	480	2200	620	570	560	560	590	600	610	2000	601	606
2	Cadmium	5		2	1		2.5	1.4	1.4	2.9	1.7		2	2.5		1.75	1.8	
3	Chromium	50	14	14												50		
4	Lead	15		8												15		

Notes:

1 All units are in micrograms per liter (µg/L) or (parts per billion)

2 Shaded results are above NCAC 2L standards.

3 Compounds not shown were not detected

4 Target analytes not shown were reported below detection limits

5 J - Value reported is between the Method Detection Limit (MDL) and the Method Reporting Limit (MRL)

Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-3												Revised NCAC 2L	MW-3	
			10/18/00	04/19/01	10/18/01	04/04/02	10/25/02	04/24/03	10/10/03	04/23/04	10/08/04	04/22/05	10/21/05	04/28/06	10/06/06		04/12/07	10/19/07
1	Benzene	1	6.6	7.3	5.1	5.4	3.8	6.5	6	3.6	3.6	5	4.4	3.6		1		3.1
2	Chlorobenzene	50	6.6	6.8		4.5	3.6	6.9	7.9	7	6.3	7	5.9	4.7		50	5.2	3.7
3	2-Chlorotoluene	140	3.4	4	1.9	2.2	1.3	3.3	2.9	2.4	1.7					DL	1	0.82 J
4	4-Chlorotoluene	DL			1.6	1.8										DL		
5	1,3-Dichlorobenzene	620				8.8										170		
6	1,4-Dichlorobenzene	75	9.8	12		9.7	7.5	12	15	15	13	12	12	8.4	7.8	1.4	9	6.5
7	1,1-Dichloroethane	700	5.4	3.8	4.4	4.4	2.5	2.8	1.8	1.9	2.4		2.6	2.2		70	2.4	2
8	1,2-Dichloroethane	0.38	1.2													0.38		
9	cis-1,2-Dichloroethene	70	6.6	7.6	6	6	5	7	6	5.2	4.4	8	5.3	5	5	70	3.6	3.8
10	1,2-Dichloropropane	0.56	3.4	2.4	2.4		1.4	2.8	1.9	1.8	1.5		2.1	2		0.51	2.3	1.6
11	Isopropylbenzene	70	2	1.9	1.4	1.3	1.2	1.4	2.9	2.7	1.5					70	1.5	1.1
12	Methylene Chloride	5	9.2	5.3												4.6		
13	Methyl tert-butyl ether (MTBE)	200	1.8					2	2	1.6						DL		
14	Tetrachloroethene	0.7	3.6	4.3			2.3						2.3	2.2		0.7	1.35	1.5
15	Toluene	1000	1													1000		
16	Trichloroethene	2.8	1.5	1.5			1.1		1.1							2.8		0.62 J
17	1,2,4-Trimethylbenzene	350	1.2	1					1.2							DL		
18	Xylenes (total)	530	14	13	2.9	2.4	1.9	9.6	12	9.6	4.5		2			530		0.97 J
	Metals																	
1	Arsenic	50																
2	Barium	2000	580	2900	500	650	550	1000	670	570	500		470	520	510	50	2.5 J	
3	Cadmium	5	3	1						1.1						2000	524	
4	Chromium	50	18	26												1.75		
																50		

Notes:

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4 Target analytes not shown were reported below detection limits

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Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-4													Revised NCAC 2L	MW-4	
			10/18/00	04/19/01	10/18/01	04/04/02	10/25/02	04/24/03	10/10/03	04/23/04	10/06/04	04/22/05	10/21/05	04/28/06	10/06/06		04/12/07	10/19/07
1	Benzene	1	3.2	3.9	6.3		1.7	2.3	2.7	6.5	1.1		1.3			1		0.62 J
2	Chlorobenzene	50	3.4	3		3.3	4	6.2	8.1	7	6.7	8	6.5		6.4	50	7.3	5.8
3	Chloroethane	2800														2800		2.1
4	2-Chlorotoluene	140														DL	0.55 J	
5	1,2-Dichlorobenzene	620	2.9	3.9	3.4	2.7	4.3	3.6	5.1	5.7	5		4.3			24	4.4	4
6	1,3-Dichlorobenzene	620			1.1		1.1	1.2	1.2	1.4	1					170	1.2	1
7	1,4-Dichlorobenzene	75	7.6	12		15	14	13	16	18	16	14	14		15	1.4	15	15
8	1,1-Dichloroethane	700	15	20	17	16	12	9.8	7.9	7.2	6.4	9	6.8		6.9	70	4.8	4.4
9	1,2-Dichloroethane	0.38	5.2	4.6	4.2		3	2.4	2.5	2.5	2.4		2.5			0.38		
10	cis-1,2-Dichloroethene	70	35	36	16	4	4	3	2				1.1	1		70		0.56 J
11	1,2-Dichloropropane	0.56	1.5	1.6	1.2	1.5	1.7	1.4	1.4	1.4	1		1.4			0.51	1.3	1.2
12	Isopropylbenzene	70														70	0.51	
13	n-Butyl Benzene	DL														70	0.38 J	
14	1,2,4-Trichlorobenzene	70	1.7													70		0.37 J
15	Trichloroethene	2.8	2.5	2.1												2.8		
16	1,2,4-Trimethylbenzene	350					2.2									DL		
17	1,3,5-Trimethylbenzene	DL														DL	1.4	
18	Vinyl Chloride	0.015	1.9	4.4		4		1.1								0.015		
	Metals																	
1	Barium	2000	320	4800	330	170	330	500	440	430	380	520	530	550	520	2000	531	571
2	Cadmium	5	2	12	3.6		5.1	2.1	1.1	1.9						1.75		
3	Chromium	50	17	24												50		
4	Lead	15		20												15		

Notes:

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4 Target analytes not shown were reported below detection limits

5 J - Value reported is between the Method Detection Limit (MDL) and the Method Reporting Limit (MRL)

Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-5												Revised NCAC 2L	MW-5	
			08/17/01	10/18/01	04/04/02	10/25/02	04/24/03	10/10/03	04/23/04	10/08/04	04/22/05	10/21/05	04/28/06	10/06/06		04/12/07	10/19/07
1	1,1-Dichloroethane	700		1.1											70		
2	cis-1,2-Dichloroethene	70	2.0	2.0		1	1								70		
3	Tetrachloroethene	0.7										1	1		0.7		
4	Trichloroethene	2.8	1.3												2.8		0.62 J
5	Vinyl Chloride	0.015	3.1												0.015		
	Metals																
1	Barium	2000	140		160		360	100				87	84	87	2000	88.6	85.1
2	Cadmium	5	8.6												1.75		
3	Lead	15	5				38								15		

Notes:

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3 Compounds not shown were not detected

4 Target analytes not shown were reported below detection limits

5 J - Value reported is between the Method Detection Limit (MDL) and the Method Reporting Limit (MRL)

Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-6												Revised NCAC 2L	MW-6	
			08/17/01	10/18/01	04/04/02	10/25/02	04/24/03	10/25/03	04/23/04	10/08/04	04/22/05	10/21/05	04/28/06	10/06/06		04/12/07	10/19/07
1	Acetone	700													700		7.4
2	Benzene	1		1.2		1.2		1.7		1					1		1.2
3	Chlorobenzene	50		11	16	12		9		4.9		3.8		14	50		15
4	Chloroethane	2800													2800		0.66 J
5	2-Chlorotoluene	140													DL		0.54 J
6	1,2-Dichlorobenzene	620		5.3	4.2	5.9		2.4		1.2		1			24		2.3
7	1,3-Dichlorobenzene	620		1.4	1.1	1.3									170		0.44 J
8	1,4-Dichlorobenzene	75		16	14	14		5.9		3.1		2.9		8.4	1.4		0.58
9	1,1-Dichloroethane	700		3.5	1.4	3.2									70		0.72 J
10	cis-1,2-Dichloroethene	70						1							70		0.4 J
11	1,2-Dichloropropane	0.56		1.4											0.51		
12	Naphthalene	21			2.8										21		
13	trans-1,3-Dichloropropene	0.19													0.19		0.31
14	1,2,4-Trimethylbenzene	350			3										DL		
15	Vinyl Chloride	0.015													0.015		0.64 J
	Metals																
1	Arsenic	50													50	2.7 J	
2	Barium	2000	650	530	960	510	350	530		520		450	240	670	2000	140	747
3	Cadmium	5	2.7J	2	1.1	2.3									1.75		
4	Chromium	50	10												50		
5	Lead	15	5												15		
6	Selenium	50			13										50		

Notes:

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3 Compounds not shown were not detected

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Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-6A												Revised NCAC 2L	MW-6A	
			08/17/01	10/18/01	04/04/02	10/25/02	04/24/03	10/10/03	04/23/04	10/08/04	04/22/05	10/21/05	04/28/06	10/06/06		04/12/07	10/19/07
1	Acetone	700													700		6.5
2	Benzene	1											1		1		0.68 J
3	Chlorobenzene	50	2.7		4	2.1	3	2.6			7	5.9	8.4	8.6	50		8.1
4	Chloroethane	2800													2800		0.67 J
5	Chloroform	0.19	1												70		
6	1,2-Dichlorobenzene	620	2.7	2.8	2.5	2.2	2.4	2.1				3.1	3.9		24	2	3.3
7	1,3-Dichlorobenzene	620													170	0.43 J	0.88 J
8	1,4-Dichlorobenzene	75			11	5.5	7.1	5.3			10	8.1	11	12	1.4	4.3	12
9	1,1-Dichloroethane	700	3.5	5.2	4.6	2.7	3.2	2.6		1	5	2.6	2.6		70		2.6
10	1,2-Dichloroethane	0.38													0.38		0.77 J
11	cis-1,2-Dichloroethene	70	1	1	<1	1	1	2							70		0.47 J
12	1,2-Dichloropropane	0.56													0.51	0.51 J	0.74 J
13	Vinyl Chloride	0.015	1.3.5		45		1.2								0.015		0.46 J
	Metals																
1	Barium	2000	520	590	650	510	560	350	250	240	740	410	850	810	2000	455	920
2	Cadmium	5	2.3			1.2									1.75		

Notes:

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3 Compounds not shown were not detected

4 Target analytes not shown were reported below detection limits

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Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-7												Revised NCAC 2L	MW-7	
			08/17/01	10/18/01	04/04/02	10/25/02	04/24/03	10/10/03	04/23/04	10/08/04	04/22/05	10/21/05	04/28/06	10/06/06		04/12/07	10/19/07
1	Acetone	700													700		9.2
2	Benzene	1	1.1				5.2	2.2				1	1		1		0.53
3	Chlorobenzene	50	1.4			1.6	2	2.2	1.8	2.1		2.2	2		50	2.5	2.2
4	Chloroethane	2800	2.4		2.1		3.4								2800		0.68 J
5	2-Chlorotoluene	140	4.1	5.4	5.7	3.8	2.4	4.2	2.9	2.2					DL	1.7	1.8
6	4-Chlorotoluene	DL		5.2											DL		
7	1,2-Dichlorobenzene	620													24	0.69 J	0.6 J
8	1,3-Dichlorobenzene	620		1											170	0.59 J	0.63 J
9	1,4-Dichlorobenzene	75				5.4	7.4	6.9	4.9	5.4	5	5.3	5.3	5.3	1.4	5.2	5.6
10	1,1-Dichloroethane	700	4.8	3.4	2.9	2.4	6.1	2.3	2.3	2.1		1.9	1.2		70	1.2	1.1
11	cis-1,2-Dichloroethene	70	25	25	23	18	12	17	14	11	12	12	7.1	8.3	70	3.5	4.1
12	1,2-Dichloropropane	0.56					3.6								0.51		0.35 J
13	Methyl tert-butyl ether (MTBE)	200	1.2			1.1	2.8	1.1							DL	0.46	
14	Naphthalene	21					22								21		
15	1,2,4-Trichlorobenzene	70													70		0.4 J
16	Vinyl Chloride	0.015	4.3		4.2		2.7	1.8	1.3	1.4					0.015	0.8 J	0.82 J
	Metals																
1	Arsenic	50													50	2.6 J	
2	Barium	2000	470	430	560	440	1100	640	500	470		520	480	530	2000	529	542
3	Cadmium	5	1.8			1.4	5.5	1.2	2.6	1.7		2.4		3.5	1.75	2.5	1.7
4	Lead	15					8								15		

Notes:

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Table 2
Historical Water Quality Data

S&ME

Lincoln County Owl's Den Landfill
S&ME Project 1356-08-002

	Volatile Organic Compounds	NCAC 2L	MW-7A											Revised NCAC 2L	MW-7A	
			08/17/01	10/18/01	04/04/02	10/25/02	04/24/03	10/10/03	04/23/04	10/08/04	04/22/05	10/21/05	04/28/06	10/06/06		04/12/07	10/19/07
1	Acetone	700													700		10
2	Benzene	1													1		0.31
3	Chlorobenzene	50	1.3			1.2		1.4		1.2		2.4	2		50	2.6	2.3
4	2-Chlorotoluene	140	2.1	2.2	2.2	1.4	1.3	1.5							DL	1.2	1.1
5	1,2-Dichlorobenzene	620													24	0.62 J	0.47 J
6	1,3-Dichlorobenzene	620													170	0.77 J	0.58 J
7	1,4-Dichlorobenzene	75				3.1	2.9	3.5	1	2.4		4.1	3.5		1.4	4.5 J	3.3 J
8	1,1-Dichloroethane	700	2	1.4	1.6	1.2	1.6	1.6	1.1	1.2		1.2			70	0.88 J	0.73 J
9	cis-1,2-Dichloroethene	70	10	8	8	7	8	9	5.6	4.2	7	5.4	4.6		70	3	2.9
10	Methyl tert-butyl ether (MTBE)	200	1												DL		
11	Trichloroethene	2.8						1.8	1.1			1	1.1		2.8		0.58 J
12	Vinyl Chloride	0.015	3.2												0.015		0.39 J
	Metals																
1	Arsenic	50													50	2.9 J	
2	Barium	2000	330	260	290	290	300	290	320	310		340	350	340	2000	377	399
3	Cadmium	5	1.4			1.1									1.75		

Notes:

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CASE NARRATIVE

Date: February 22, 2008
Client: S&ME, Inc.
Project #: Owl's Den LF
Lab ID: C703508

Overview

All samples submitted were analyzed by Environmental Conservation Laboratories, Inc. in accordance with the methods referenced in the laboratory report. Any particular difficulties encountered during sample handling by Environmental Conservation Laboratories, Inc. will be discussed in the QC Remarks section below.

Quality Control Samples

No Comments

Quality Control Remarks

VGCMS As a laboratory oversight, false positives were initially reported for sample MW-1 (C703508-01) on April 26th, 2007. The data presented in this report has been revised from a secondary review at the bench level and is correct as reported.

Other Comments

None

The analytical data presented in this report are consistent with the methods as referenced in the analytical report. Any exceptions or deviations are noted in the QC remarks section of this narrative.

Released By:
Environmental Conservation Laboratories, Inc.

Chuck Smith
Project Manager

LETTER OF TRANSMITTAL

S&ME, Inc.
9751 Southern Pine Blvd.
Charlotte, North Carolina 28273
(704) 523-4726
Fax (704) 525-3953

DATE 2/28/08	JOB NO. 1356-08-002
ATTENTION **Jaclynne Drummond**	
RE: **Owl's Den Landfill**	
Assessment Plan	
North Carolina Department of Environment and Natural Resources	
Department of Waste Management – Solid Waste Section	
1646 Mail Service Center	**Phone:**
Raleigh, North Carolina 27699 -1646	**Fax:**

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

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☐ Copy of letter ☒ Report ☐ Calculation ☐ CD

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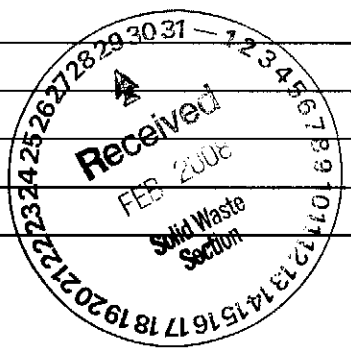
1			**Owl's Den Landfill – Assessment Plan**



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